

What I claim is:

1. A method of optimizing a magnetic core, the core having inner and outer radii and wire windings, comprising the steps of:
 - a) allowing the core radii to change parametrically in a nested loop;
 - b) computing core reluctance, number of turns, and winding resistance for each position;
 - c) computing the maximum induced membrane voltage based on the following equation:

$$V_m(t) = f \sqrt{\frac{2W}{R}} \omega \tau_L \left(4\omega^2 \tau_L^2 - 1 \right) \cdot \\ \left(e^{-\frac{t}{2\tau_L}} \cos(\beta) + \frac{e^{-\frac{t}{2\tau_L}} (2\tau_L \tau_m \omega^2 - 1) \sin(\beta)}{\sqrt{4\omega^2 \tau_L^2 - 1}} - e^{-\frac{t}{\tau_m}} \right),$$

$$\text{where } \beta = \frac{1}{2} \sqrt{\frac{4\omega^2 \tau_L^2 - 1}{\tau_L^2}} t.$$

1. A method of optimizing a magnetic core, the core having inner and outer radii and wire windings, comprising the steps of:
 - a) allowing the core radii to change parametrically in a nested loop;
 - b) computing core reluctance, number of turns, and winding resistance for each position;
 - c) computing the maximum induced membrane voltage based on the following equation;
 - d) fitting a membrane voltage to the inner and outer radii using a multi-variable spline analysis; and
 - e) using a variable metric sequential quadratic program algorithm to compute the combination of inner and outer radii that maximizes the peak membrane voltage.

2. A method according to Claim 1 further comprising the step of:
f) repeating step e) with a Monte-Carlo starting guess algorithm ,
wherein said step f) insures that a global maximum is found.

3. A method according to Claim 1, wherein said method is performed with a preselected wire size.

4. A method according to Claim 1, further comprising the initial step of selecting a wire size.

5. A method according to Claim 2, further comprising the initial step of selecting a wire size.

6. A method according to Claim 4, further comprising the steps of:
g) selecting different wire sizes, and
h) repeating steps a-f for each different wire size selected.

7. A method according to Claim 5, further comprising the steps of:
g) selecting different wire sizes, and
h) repeating steps a-f for each different wire size selected.

8. A method according to Claim 6, further comprising the step of:
i) selecting the wire size which maximizes the membrane voltage.

9. A method according to Claim 7, further comprising the step of:
 - i) selecting the wire size which maximizes the membrane voltage.
10. A magnetic core produced by the method of Claim 1.